

FIELD OF ACTIVITY



Laboratory standard lamp



Laboratory for Speedometers



Laboratory of Refractometry

In the fields of Photometry and Radiometry, the Laboratory is responsible for the development of national metrology standards and has the following incumbencies: the maintenance of the national standard of the Luminous Intensity, calibrations, participation and coordination of inter-laboratories comparisons and support for Legal Metrology.

In the field of Refractometry, the Laboratory is responsible for the development of national metrology standards and has the following incumbencies: calibrations of refractometers for liquids, certifications of standard solutions for refractometers and tests of the Metrological Control of refractometers for grape musts.

In the field of Radiofrequencies, the Laboratory performs tests of Metrological Control of speedometers that are used for the road traffic law enforcement and performs the calibration of speedometers, such as GPS receivers, for speed measurement of road vehicles.

SI UNITS

**International System (SI) Base Unit of Luminous Intensity ( $I_v$ ):**

**candela (cd)** defined as:

The luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency  $540 \times 10^{12}$  hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.

**SI derived unit of the quantity Illuminance ( $E$ ):**

**lux (lx or  $\text{lm}/\text{m}^2$ )** defined as:

The illuminance of a 1 lumen luminous flux in a 1 square meter surface.

**Dimensionless Derived Quantity Refractive Index ( $n$ ):**

(of a medium, for a monochromatic radiation) defined as:

The ratio of the speed of the electromagnetic waves in vacuum to the phase speed in a given direction of the waves of the monochromatic radiation in the medium.




TRACEABILITY

In the fields of Photometry and Spectrophotometry, respectively, a photometric bench with standard lamps and a standard photometer on the one hand and high performance spectrophotometers with standard filters and tiles, on the other hand, obtain the traceability from other NMI national standards.

In the field of Refractometry, the measurements traceability is obtained to certified reference materials.

In the field of Radiofrequencies, the traceability to the quantity time is obtained from the LNM national standard of the second. The traceability to the quantity length is obtained from the LNM national standard of the metre.

**AVAILABLE SERVICES****Calibration**

MEASURING INSTRUMENT	MEASURING INTERVAL	EXPANDED UNCERTAINTY ( $k=2$ )	CMC
Lamps	50 cd to 1 000 cd	1,6 %	
Illuminance meters	5 lx to 1 000 lx	1,6 %	
Photometers	reading/lx; V/lx	1,6 %	
Spectrophotometers for Regular Transmission	1,0 % to 90,0 %	0,3 %	
Spectrophotometers for Regular Reflection	1,0 % to 90,0 %	0,3 %	
GPS Receivers for speed measurement	up to 300,0 km/h	0,5 km/h	
Speedometers	up to 300 km/h	1 km/h	
Refractometers for liquids	$1,320\ 00 \leq n \leq 1,580\ 00$	0,000 02	
	$0,00\ \text{cg/g} \leq X_m \leq 85,00\ \text{cg/g}$	0,02 cg/g	
	$0,00\ \text{cL/L} \leq X_{V,\text{pot}} \leq 55,00\ \text{cL/L}$	0,01 cL/L	

**Preparation or Certification of Reference Materials**

REFERENCE MATERIAL	MEASURING INTERVAL	EXPANDED UNCERTAINTY ( $k=2$ )	CMC
Filters for regular transmittance	380 nm to 780 nm	0,2 nm	
Tiles for regular reflectance	380 nm to 780 nm	0,2 nm	
Filters for regular transmittance	1,0 % to 90,0 %	0,3 %	
Tiles for regular reflectance	1,0 % to 90,0 %	0,3 %	
Standard solutions for refractive index	$1,320\ 00 \leq n \leq 1,580\ 00$	0,000 02	
Standard aqueous solutions for sucrose mass fraction	$0,00\ \text{cg/g} \leq X_m \leq 85,00\ \text{cg/g}$	0,02 cg/g	
Standard aqueous solutions for potential alcohol volume fraction	$0,00\ \text{cL/L} \leq X_{V,\text{pot}} \leq 55,00\ \text{cL/L}$	0,01 cL/L	

**Metrological Control**

MEASURING INSTRUMENT	TESTS	LEGISLATION
Speedometers	Type Approval Initial Verification	Portaria n.º 1542 / 2007 de 6 de dezembro
Refractometers for grape musts	Periodical Verification Extraordinary Verification	Portaria n.º 1548 / 2007 de 7 de dezembro

**CONTACTS****INSTITUTO PORTUGUÊS DA QUALIDADE  
(Portuguese Institute for Quality)**

Rua António Gião, 2 , PT-2829-513 Caparica

**PHOTOMETRY, RADIOMETRY AND  
RADIOFREQUENCIES LABORATORY**

Photometry, Radiometry and Speed

Head: Olivier Pellegrino, PhD

Tel: +351 212 948 179

E-mail: [opellegrino@ipq.pt](mailto:opellegrino@ipq.pt)

Kinetic Metrology

Head: Carlos Pires, MSc

Tel: +351 212 948 142

E-mail: [carlosp@ipq.pt](mailto:carlosp@ipq.pt)